

## IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

- 1           1.       (Currently Amended) A storage area network, comprising:
  - 2           a storage system for providing storage of system data;
  - 3           at least one application host running an application thereon and accessing data on
  - 4       the storage system;
  - 5           at least one I/O performance gateway, disposed between the at least one
  - 6       application host and the storage subsystem, for intercepting I/O operations;
  - 7           ~~a database for storing service level agreements; and~~
  - 8           a Service Level Agreement (SLA) server, coupled in parallel with the at least one
  - 9       I/O performance gateway and the storage system, for controlling the at least one I/O
  - 10      performance gateways based on ~~the~~ service level agreements, ~~wherein the at least one I/O~~
  - 11      ~~performance gateway sending statistic data to the SLA server and taking requests from~~
  - 12      ~~the SLA server to control I/O operations; and~~
  - 13           a database, coupled to the SLA server, for storing service level agreements;
  - 14      wherein the at least one I/O performance gateway sends statistics data to the SLA server
  - 15      and receives I/O control requests from the SLA server to control I/O operations of the
  - 16      performance gateway;
  - 17           wherein the SLA server further comprises:
    - 18           a database manager, coupled to the database, for maintaining connections
    - 19       to the database ~~wherein and for maintaining~~ service level agreements and performance
    - 20       ~~data are maintained in the database;~~

21                   an SLA services module for analyzing data and controlling actions based  
22   on the service level agreements and policy;  
23                   an application server for communicating with clients to provide display  
24   monitoring information for presentation at an SLA client and ~~for to provide~~  
25   communication ~~with~~ between the database manager and the SLA client; and  
26                   a performance monitor, coupled to the SLA services module, for  
27   communicating with the at least one I/O performance gateway to collect data and send  
28   throttling requests based upon signals from the SLA services module, wherein the  
29   performance monitor is configured to provide at least one thread pair for processing  
30   inbound signals from the at least one I/O performance gateway being sent to the SLA  
31   services module via an inbound thread and for processing outbound signals to the at least  
32   one I/O performance gateway received from the SLA services module via an outbound  
33   thread, the inbound thread and the outbound thread operating asynchronously to provide  
34   non-blocking messaging.

1                   2.       (Original)     The storage area network of claim 1 wherein the SLA  
2   services module further comprises:  
3                   a performance analyzer for setting throttling parameters and discovering new i/o  
4   performance gateways;  
5                   an entity service module for providing in-memory caching of collected statistical  
6   data by polling data from the i/o performance gateways; and  
7                   a policy manager for ensuring actions meet service level agreements and policy  
8   rules.

1           3.       (Original)     The storage area network of claim 1 further comprising a  
2     storage resource manager for monitoring the storage system.

1           4.       (Original)     The storage area network of claim 1 wherein the SLA  
2     server further includes a mailbox disposed between the SLA services module, the  
3     database manager, the application server and the performance monitor, the mailbox  
4     providing a non-blocking two-step communication scheme for allowing concurrent  
5     servicing of multiple I/O requests and database requests.

1           5.       (Original)     The storage area network of claim 1 wherein the  
2     performance monitor includes a plurality of processors for controlling communication,  
3     the at least one thread pair comprising a thread pair for each of the plurality of  
4     processors.

1           6.       (Original)     The storage area network of claim 5 wherein a thread pair  
2     for each of the plurality of processors are associated with a subgroup of SLA processes of  
3     the SLA services module and a subgroup of gateways.

1           7.       (Original)     The storage area network of claim 1 wherein the  
2     performance monitor includes a single processor for controlling communication, the  
3     inbound thread receiving signals from all gateways and providing a path to all processes  
4     of the SLA services module communicating with the performance monitor.

8. (Currently Amended) A Service Level Agreement (SLA) server,  
comprising:

a database manager, coupled to a database, for maintaining connections to the  
database ~~wherein and for maintaining~~ service level agreements and performance data ~~are~~  
maintained in the database;

an SLA services module for analyzing data and controlling actions based on the  
service level agreements and policy;

an application server for communicating with clients to ~~provide display~~  
monitoring information for presentation at an SLA client and ~~for to provide~~  
communication ~~with~~ between the database manager and the SLA client; and

a performance monitor, coupled to the SLA services module, for communicating  
~~with the~~ at least one I/O performance gateway to collect data and send throttling requests  
based upon signals from the SLA services module, wherein the performance monitor is  
configured to provide at least one thread pair for processing inbound signals from the at  
least one I/O performance gateway being sent to the SLA services module via an inbound  
thread and for processing outbound signals to the at least one I/O performance gateway  
received from the SLA services module via an outbound thread, the inbound thread and  
the outbound thread operating asynchronously to provide non-blocking messaging.

1           9.     (Original)     The SLA server of claim 8 wherein the SLA services  
2     module further comprises:  
3           a performance analyzer for setting throttling parameters and discovering new i/o  
4     performance gateways;  
5           an entity service module for providing in-memory caching of collected statistical  
6     data by polling data from the i/o performance gateways; and  
7           a policy manager for ensuring actions meet service level agreements and policy  
8     rules.

1           10.    (Original)    The SLA server of claim 8 wherein the SLA server further  
2     includes a mailbox disposed between the SLA services, the database manager, the  
3     application server and the performance monitor, the mailbox providing a non-blocking  
4     two-step communication scheme for allowing concurrent servicing of multiple I/O  
5     requests and database requests.

1           11.    (Original)    The SLA server of claim 8 wherein the performance  
2     monitor includes a plurality of processors for controlling communication, the at least one  
3     thread pair comprising a thread pair for each of the plurality of processors.

1           12.    (Original)    The SLA server of claim 11 wherein a thread pair for each  
2     of the plurality of processors is associated with a subgroup of SLA processes of the SLA  
3     service module and a subgroup of gateways.

1           13.     (Original)     The SLA server of claim 8 wherein the performance  
2     monitor includes a single processor for controlling communication, the inbound thread  
3     receiving signals from all gateways and providing a path to all processes of the SLA  
4     services module communicating with the performance monitor.

1           14.     (Original)     A performance monitor for controlling communication  
2     between two functional entities, comprising:  
3             at least one processor configured for processing signals between at least one I/O  
4     performance gateway and SLA services module processes; and  
5             a thread pair associated with each of the at least one processors, each thread pair  
6     processing inbound signals from the at least one I/O performance gateway being sent to  
7     the SLA services module via an inbound thread and for processing outbound signals to  
8     the at least one I/O performance gateway received from the SLA services module via an  
9     outbound thread, the inbound thread and the outbound thread operating asynchronously  
10    to provide non-blocking messaging.

1           15.     (Original)     The performance monitor of claim 14 wherein the at least  
2     one processor comprises a plurality of processors for controlling communication.

1           16.     (Original)     The performance monitor of claim 15 wherein each thread  
2     pair associated with a processor is associated with a subgroup of SLA processes of the  
3     SLA services module and a subgroup of gateways.

1           17.     (Original)     The performance monitor of claim 14 wherein the at least  
2     one processor comprises a single processor, the inbound thread receiving signals from all  
3     gateways and providing a path to all processes of the SLA services module  
4     communicating with the performance monitor.

1           18.     (Currently Amended) A program storage device readable by a computer,  
2     the medium tangibly embodying one or more programs of instructions executable by the  
3     computer to perform a method for providing non-blocking, minimum threaded two-way  
4     messaging, the method comprising:  
5             providing at least one processor for controlling communication between SLA  
6     processes of ~~the~~ an SLA services module and at least one I/O performance gateway; and  
7             providing a thread pair associated with each of the at least one processors for  
8     processing inbound signals from the at least one I/O performance gateway being sent to  
9     the SLA services module via an inbound thread and for processing outbound signals to  
10    the at least one I/O performance gateway received from the SLA services module via an  
11    outbound thread, wherein the inbound thread and the outbound thread operate  
12    asynchronously to provide non-blocking messaging.

1           19.     (Original)     The program storage device of claim 18 wherein the  
2     providing a thread pair associated with each of the at least one processors further  
3     comprises associating each thread pair associated with a processor with a subgroup of  
4     SLA processes of the SLA services module and a subgroup of gateways.

1           20.    (Original)    The program storage device of claim 18 wherein the  
2    providing at least one processor further comprises providing a single processor, and  
3    wherein the providing a thread pair associated with each of the at least one processors  
4    further comprises providing a signal thread pair, wherein an inbound thread receives  
5    signals from all gateways and provides a path to all processes of the SLA services  
6    module.

1           21.    (Currently Amended) A method for providing non-blocking, minimum  
2    threaded two-way messaging, comprising:  
3           providing at least one processor for controlling communication between SLA  
4    processes of ~~the~~ an SLA services module and at least one I/O performance gateway; and  
5           providing a thread pair associated with each of the at least one processors for  
6    processing inbound signals from the at ~~least~~ least one I/O performance gateway being sent  
7    to the SLA services module via an inbound thread and for processing outbound signals to  
8    the at least one I/O performance gateway received from the SLA services module via an  
9    outbound thread, wherein the inbound thread and the outbound thread operate  
10   asynchronously to provide non-blocking messaging.



1           22. (Currently Amended) A storage area network, comprising:  
2           storage means for providing storage of system data;  
3           at least one application means for running an application thereon and for  
4           accessing data on the storage means;  
5           at least one gateway means, disposed between the at least one application host and  
6           the storage subsystem, for intercepting I/O operations;  
7           ~~means for storing service level agreements; and~~  
8           ~~means, coupled in parallel with the at least gateway means and the storage means,~~  
9           for controlling the at least one ~~I/O performance~~ gateways means based on service level  
10          agreements; and  
11          means, coupled to the means for controlling the at least on gateway means, for  
12          storing service level agreements, wherein the at least one gateway means sends statistic  
13          data to the means for controlling and receiving I/O control requests from the means for  
14          controlling to control I/O operations of the at least one gateway means;  
15          wherein the means for controlling further comprises:  
16          means, coupled to the means for storing service level agreements, for  
17          managing and maintaining connections to the means for storing service level agreements;  
18          means for analyzing data and controlling actions based on the service level  
19          agreements and policy;  
20          means for communicating with clients to provide ~~display~~ monitoring  
21          information for presentation at an SLA client and ~~for to provide~~ communication with  
22          between the means for managing and maintaining connections to the means for storing

23 service level agreements and the means for controlling the at least one gateway means;

24 and

25 means, coupled to the means for controlling the at least one gateway

26 means, for communicating with the at least one gateway means to collect data and send

27 throttling requests based upon signals from the means for analyzing data and controlling

28 actions, wherein the means for communicating is configured to provide at least one

29 thread means for processing inbound signals from the at least one gateway means being

30 sent to the means for analyzing data and controlling actions via an inbound means and for

31 processing outbound signals to the at least one gateway means received from the means

32 for analyzing data and controlling actions via an outbound means, the inbound means and

33 the outbound means operating asynchronously to provide non-blocking messaging.

23. (Currently Amended) A Service Level Agreement (SLA) server,  
comprising:

means, coupled to a means for storing service level agreements, for managing and  
maintaining connections to the means for storing service level agreements and for  
maintaining service level agreements and performance data in the means for storing  
service level agreements;

means for analyzing data and controlling actions based on the service level  
agreements and policy;

means for communicating with clients to provide ~~display~~ monitoring information  
for presentation at an SLA client and for to provide communication ~~with~~ between the  
means for managing and maintaining connections to the means for storing service level  
agreements and the SLA client; and

means, coupled to the means for analyzing data and controlling actions, for  
communicating with the at least one gateway means to collect data and send throttling  
requests based upon signals from the means for analyzing data and controlling actions,  
wherein the means for communicating is configured to provide at least one thread means  
for processing inbound signals from the at least one gateway means being sent to the  
means for analyzing data and controlling actions via an inbound means and for  
processing outbound signals to the at least one gateway means received from the means  
for analyzing data and controlling actions via an outbound means, the inbound means and  
the outbound means operating asynchronously to provide non-blocking messaging.

1           24.   (Original)   A performance monitor for controlling communication  
2   between two functional entities, comprising:  
3           at least one processing means configured for processing signals between at least  
4   one I/O performance gateway means and SLA services means; and  
5           a thread means associated with each of the at least one processors, each thread  
6   means processing inbound signals from the at least one I/O performance gateway being  
7   sent to the SLA services module via an inbound means and for processing outbound  
8   signals to the at least one I/O performance gateway received from the SLA services  
9   module via an outbound means, the inbound means and the outbound means operating  
10   asynchronously to provide non-blocking messaging.